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On *Neolepisorus emeiensis* and *N. dengii* (Polypodiaceae) from China

Xiao-si Guo
College of Life Science, Northwest A & F University, Yangling, Shaanxi 712100, P. R. China
Bin Li
Xi'an Botanical Garden, Xi'an, Shaanxi 710062, P. R. China

Abstract.—*Neolepisorus dengii*, *N. dengii* f. *hastatus* and *N. emeiensis* f. *dissectus* should be considered synonyms of *N. emeiensis*. This treatment is justified on the basis of complete intergradation of the frond forms that supposedly separate these taxa. The intergradation can be found on the same individual.

Key Words.—*Neolepisorus*, China, synonyms

Neolepisorus occurs in tropical and subtropical Asia and Africa. It has one center of distribution in the Yangtze River area and south and southwest China. Its species are endemic to mainland China except for one endemic to Madagascar, one in Indo-Himalayas, upper Burma, northern Thailand, Indo-China and China, and a third in Japan, Philippines and China (including Taiwan). As originally proposed by Ching (1940), *Neolepisorus* consisted of three species: *N. lastii* (Baker) Ching, *N. ovatus* (Bedd.) Ching, and *N. ensatus* (Thunb.) Ching. Subsequently Ching and Shing (1983) published regional taxonomic revisions of Chinese *Neolepisorus* and recognized 10 species, a conclusion with confirmed by Lin Youxing (2000).

Based on the study of specimens at KUN, PE, SZ and WUK, we came to doubt the establishment of a species and two forms that were named by Ching and Shing (1983). They claimed that *Neolepisorus emeiensis* and *N. dengii* differed in the shape of the lamina base. Furthermore, the published two forms, *N. emeiensis* f. *dissectus* and N. *dengii* f. *hastatus*, also based on differences in the shape of the lamina base. Our field observations and identification of *Neolepisorus* from southern Shaanxi Province, especially the Dabashan Mountain region, have confirmed these forms intergrade and therefore do not merit taxonomic recognition. We suggest that *N. dengii*, *N. dengii* f. *hastatus* and *N. emeiensis* f. *dissectus* be considered synonyms of *N. emeiensis*.

Neolepisorus emeiensis Ching et K. H. Shing, Acta Phytotax. Sin. 21(3): 271, f. 2:1, 1983. TYPE.—China. Sichuan: Mount Emei, Hongchunping, 1150 m [erroneously as "1500" m in the protologue], 27 August 1964, *K. J. Kuan et al.1836* (Holotype, PE!)

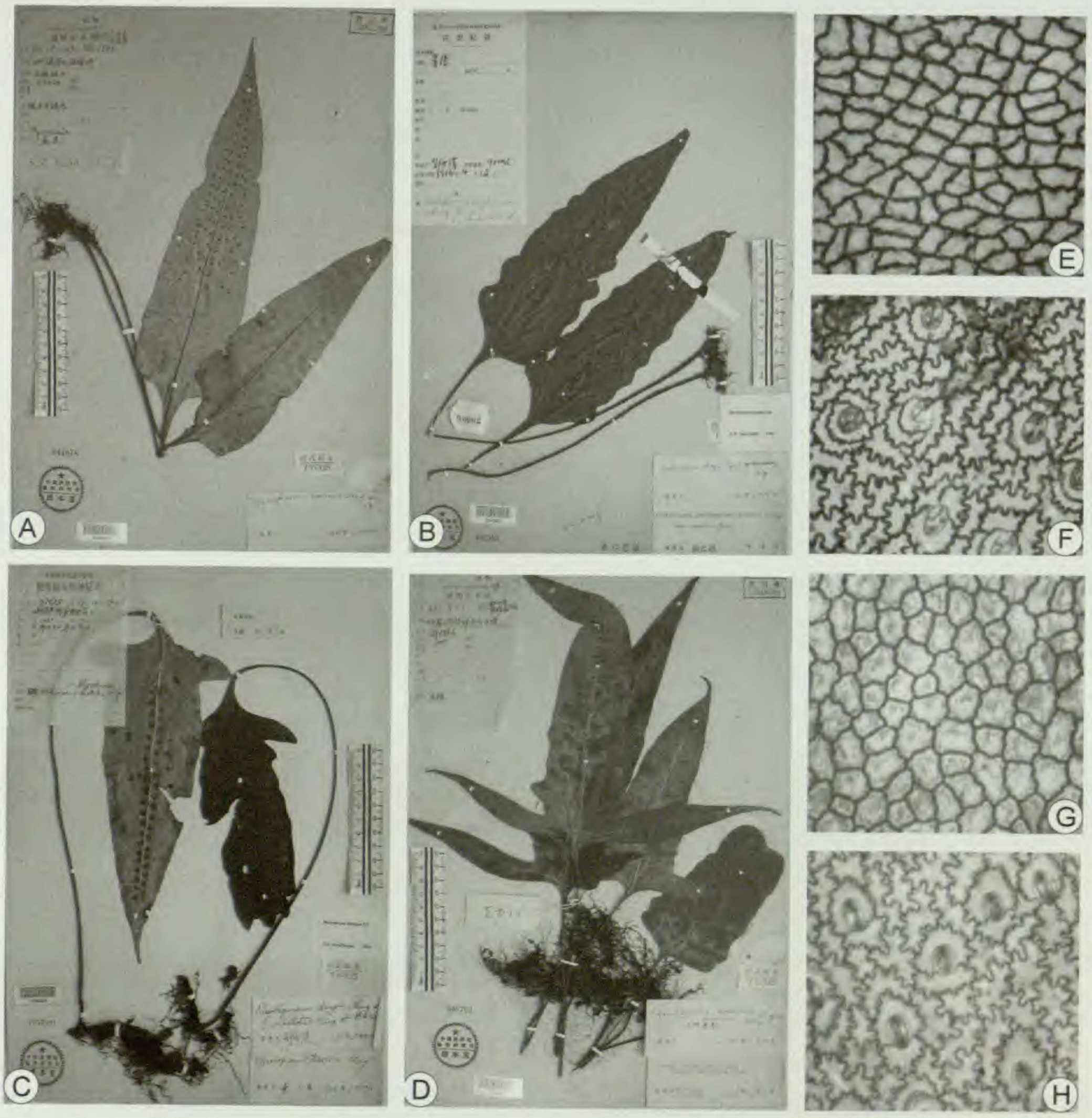

FIG. 1. Herbarium specimens and epidermal structures of two species of *Neolepisorus*. A. The holotype of *Neolepisorus emeiensis* (*K. J. Guan & W. C. Wang 1836*, PE). B. The holotype of *N. dengii* (*S. W. Deng 90002*, PE). C. The holotype of *N. dengii* f. *hastatus* (*P. S. Wang 75473*, PE). D. The holotype of *N. emeiensis* f. *dissectus* (*G. X. Shing & K. Y. Lang 1143*, PE). E. Upper epidermis of *N. emeiensis* (*T. L. Dai* 107331, WUK). F. Lower epidermis of *N. emeiensis* (*T. L. Dai* 107331, WUK). G. Upper epidermis of *N. dengii* (*T. P. Wang 8542*, WUK). H. Lower epidermis of *N. dengii* (*T. P. Wang 8542*, WUK).

Neolepisorus dengii Ching et P. S. Wang, Acta Phytotax. Sin. 21(3): 272, f. 2:3, 1983, syn. nov. TYPE.—China. Guizhou: Guiyang, 12 April 1936, *S. W. Deng 90002 bis* (Holotype, PE!)

Neolepisorus dengii Ching et P. S. Wang f. *hastatus* Ching et P. S. Wang, Acta Phytotax. Sin. 21(3): 271, f. 2:4, 1983; TYPE.—China. Guizhou: Anshun, 1260 m, 17 December 1977, *P. S. Wang 75473* (Holotype, PE!)

TABLE 1. Comparison of *Neolepisorus emeiensis* and *N. dengii*.

Character	*N. emeiensis*	*N. dengii*
Habitat	wet forest floors	shady places or on rocks
Altitude	500–1800 m	500–1300 m
Rhizomes	long-creeping	long-creeping
Scales	brown, ovate-lanceolate	dark brown, lanceolate
Frond texture	lightly coriaceus at dry	thickly chartaceous at dry
Frond length	24–28 cm	20–27 cm
Frond shape	broadly oblong-lanceolate, 6–7 cm wide, widest at base	triangular-lanceolate, 5–8 cm wide, widest at base
Frond base	obliquely cuneate	lightly hastate or obliquely cuneate
Frond color	yellow-green at dry	brown or brown-green at dry
Lateral veins	mostly flat, visible, free	lightly oblique, visible
Sori	round, larger, borne in 1–2 rows between the lateral main veins	round, smaller, borne in 1–2 row between the lateral main veins

Neolepisorus emeiensis Ching et K. H. Shing f. *dissectus* Ching et Shing, Acta Phytotax. Sin. 21(3): 271, f. 2:2, 1983. TYPE.—China. Sichuan: Mount Emei, 1000 m, 1 September 1963, *K. H. Shing et K. Y. Lang 1143* (Holotype, PE!)

DISTRIBUTION AND HABITAT.—China (Sichuan, Hubei, Jiangxi, Guizhou, Southern Shaanxi); forests on hills or slopes or in valleys; 500–1800 m.

The protologue of *Neolepisorus dengii* (Fig. 1B) claims that it differs from *N. emeiensis* (Fig. 1: A) by triangular-lanceolate fronds, slightly hastate lamina bases, thickly chartaceous, brown or brown-green laminae when dry, and lateral veins slightly oblique. Otherwise, the two species do not differ. After examining more material of *N. emeiensis*, we conclude that its frond shape falls within the range of variation of *N. dengii* (Table 1).

To further test for differences, we studied the epidermis of *Neolepisorus dengii* and *N. emeiensis* with an optical microscope. We found that the two species have similarly shaped epidermal cells, including the distribution, structure, and type of stomata (Fig. 1: E, F, G, H). The arrangement of the upper epidermal cells in two species was also the same. There are copolocytic and coaxillocytic stomata in the lower epidermis. Thus we found no differences in epidermal characters between the two species.

Neolepisorus dengii f. *hastatus* (Fig. 1: C) and *N. emeiensis* f. *dissectus* (Fig. 1: D) differ from *N. emeiensis*, respectively, only by the base of fronds hastate or with 1 or 2 pairs of long lanceolate segments. In observing many individuals in southern part of Shaanxi Province, we found that the fronds lobed or with 1–2 pair of segments (from lobate to triangular to lanceolate in shape) at base often occurs in *N. emeiensis* (Fig. 2). Through a wide range of herbarium and field investigations, two foliar variations in *N. emeiensis* have been determined: 1) from broadly oblong-lanceolate, triangular-lanceolate to halberd-shaped in shape, and 2) from obliquely cuneate to hastate at base. These two foliar variations are the basis of the two named forms. Thus we

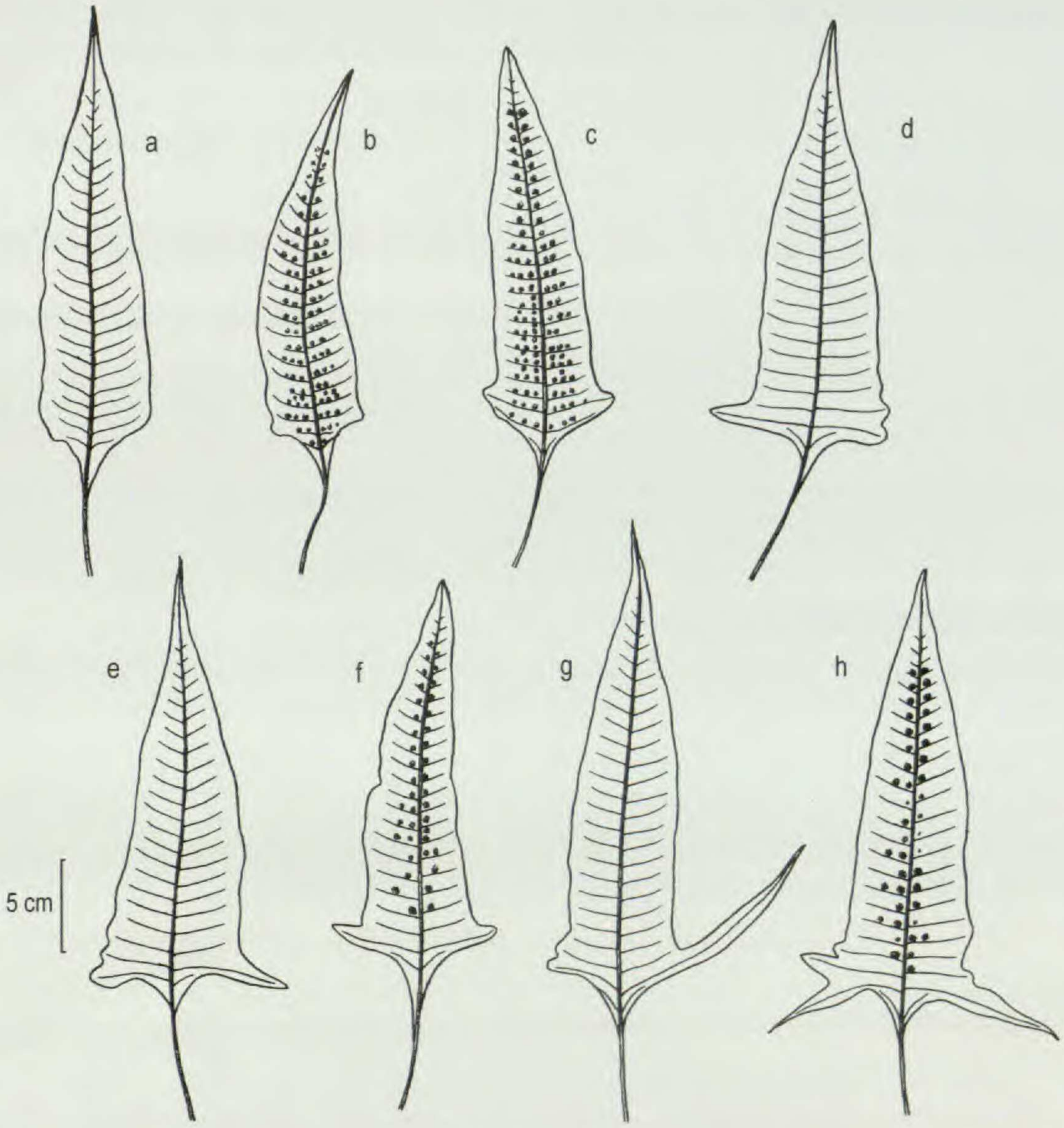

FIG. 2. Intergradation in frond form in a single individual of *Neolepisorus emeiensis* (*Y. S. Chen et al. 2206*, WUK). A, B, Frond broadly oblong-lanceolate, base obliquely cuneate. C–F. Frond lanceolate or triangular-lanceolate, base lightly hastate. G, H. Frond triangular-lanceolate, base with 1 or 2 pairs of long lanceolate segments.

concluded that the shape of the lamina base is an unstable character, which could not be used to establish a new taxon.

All supposedly diagnostic characters of *Neolepisorus dengii*, *N. dengii* f. *hastatus* and *N. emeiensis* f. *dissectus* are variable and fall within the range of that found in *N. emeiensis*. Therefore, *N. dengii*, *N. dengii* f. *hastatus* and *N. emeiensis* f. *dissectus* should be considered synoymyms of *N. emeiensis*.

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